

C. REMARKS/ARGUMENTS

1. Status of the Claims

Claims 1, 3, 4, 21, 22 and 24-26 are currently pending in the application. (Claims 27-33 have been withdrawn from consideration by the Examiner, as being directed to a non-elected invention.) Claim 1 is independent. Claims 3, 4, 21, 22, and 24-26 depend on claim 1.

Applicant notes with appreciation that claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant has not rewritten claim 4 in independent form, in the belief that claim 1, upon which claim 4 depends, is allowable, as discussed in full in section 6 below.

Claim 25 has been canceled.

Claim 26 has been amended. No new matter is added by the amendment to claim 26, as discussed in full in section 3 below.

Claims 27-33 have been withdrawn.

2. Summary of Record of Telephone Interview Dated May 20, 2003

A telephone interview took place between Mark Lappin (Applicant's representative) and Examiner Erik Kielin, on May 20, 2003 ("the interview"). The present section (C-2) provides a recordation of the substance of the interview, as is required in the present formal written reply to the Office Action of July 15, 2003.

During the interview, all the claims that were pending at the time of the interview (i.e. claims 1, 2, 4, and 21-22) were discussed. Also discussed were some proposed new claims, as described below.

The following prior art was discussed during the interview: 1) EPA (European Patent Application) 0 624 900 A2 to Sparks ("Sparks"); and 2) U.S. Pat. No. 5,578,976 to Yao ("Yao"). Applicant's representative distinguished Sparks and Yao. Specifically, Applicant pointed out that: 1) Sparks disclosed a bulk surface micromachining process in which the substrate itself was etched, instead of a process in which structural material deposited on the substrate was etched (as in the present invention); and that 2) Yao disclosed no sealed cavity, and did not relate to any encapsulation of any microstructure.

It was proposed by Applicant's representative during the interview that the pending claims be amended to distinguish Applicant's invention from Sparks and Yao, and in particular that independent claim 1 be amended to recite the step of depositing an etchable layer of structural material, and the step of forming a sealed cavity that encapsulates the movable microstructure. It was also proposed by Applicant's representative during the interview that new claims be added that are directed to the product (encapsulated microstructure) disclosed in Applicant's disclosure, rather than to the method of fabricating the product.

The Examiner agreed to walk through the entry (by Applicant's representative) of a faxed amendment, if the amendment is faxed to the fax number 703-746-3877. Accordingly, an amendment was faxed by Applicant's representative to the fax number 703-746-3877.

3. Rejection of Claims 25-26 Under 35 U.S.C. § 112

Claim 25 stands rejected under 35 U.S.C. § 112, second paragraph. In response, Applicant hereby cancels claim 25.

Claim 26 stands rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. (In particular, the Examiner states: "The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. . . . [Claim 26] is not enabled since the sentence is incomplete and what is being claimed is incomprehensible.")

In the previous Amendment and Response (dated December 16, 2002), claim 26 was inadvertently left incomplete, by error. Applicant hereby amends claim 26, to state: "The method of claim 1, wherein said one or more holes are etched into said cap layer so as to establish communication with said first and second layers of sacrificial material."

No new matter is added by this amendment, support for which can be found for example in Applicant's specification, from page 6, line 31 to page 7, line 2.

Applicant submits that amended claim 26 now contains subject matter that is described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention, and therefore that the

rejection of claim 26 under 35 U.S.C. § 112, first paragraph is now overcome.

Accordingly, Applicant respectfully requests that the rejection of claim 26 under 35 U.S.C. § 112 ¶ be reconsidered and withdrawn.

4. **Rejection of Claims 1, 2, 21, 22, and 26 Under 35 U.S.C. § 102(b)** (or in the alternative, under 35 U.S.C. § 103)

Claims 1, 2, 21, 22, and 26 stand rejected under 35 U.S.C. § 102 (b) as being anticipated by U.S. Pat. No. 5,285,131 to Muller (henceforth "Muller"), in view of U.S. Pat. No. 6,441,451 to Ikeda (henceforth "Ikeda"). The Applicant respectfully traverses these rejections. (Applicant believes that the Examiner meant to reject claim 3, not claim 2, since claim 2 is canceled, and claim 3 is currently pending.)

It is well established that a prior art reference anticipates a claim only if the reference discloses all the elements and limitations of the claim. If even one element or limitation of the claim is missing, a § 102 rejection fails. See e.g. Kalman v. Kimberly-Clark, 713 F.2d 760, 771, 218 U.S.P.Q. 781 (Fed. Cir. 1983).

Applicant respectfully submits neither Muller nor Ikeda anticipates the present invention, which is very different from both Muller and Ikeda. The present invention relates to encapsulation of movable MEMS structures, using a dry plasma etch to etch away the sacrificial materials and movably release a MEMS structure within a sealed cavity. (See e.g. claim 1).

Muller relates to a microlamp having a filament enclosed within a vacuum-sealed cavity. In contrast to the microstructure of the present invention, and to the requirements of claim 1 (and the claims dependent thereon), the filament is not a movable microstructure that is movably released within a sealed cavity. Also, the filament does not "contact the substrate at least at an anchor point," as required by pending claim 1. Further, as acknowledged by the Examiner, Muller does not teach using dry etch plasma to remove sacrificial material, in contrast to the requirement of pending claim 1.

Ikeda features a pressure transducer, and does not relate in any way to a movable microstructure that is formed within a sealed cavity. The cavity disclosed in Ikeda is neither sealed (see through-hole 190), nor does it encapsulate any microstructure, movable or otherwise,

as required by claims 1, 3, 21, 22, and 26.

For these reasons, neither Muller nor Ikeda anticipate claims 1, 3, 21, 22, and 26 under 35 U.S.C. § 102 (b).

Because the Examiner states, in the last paragraph of page 5, that “It would have been obvious for one of ordinary skill in the art . . . “ Applicant believes that the Examiner perhaps meant to reject claims 1, 3, 21, 22, and 26 under 35 U.S.C. § 103, not under U.S.C. § 102 (b). Accordingly, Applicant submits that claims 1, 3, 21, 22, and 26 are not obvious under 35 U.S.C. § 103 under Muller in view of Ikeda.

The Examiner states: “It would have been obvious for one of ordinary skill in the art, at the time of the invention, to use dry plasma to etch the sacrificial material of Muller, to prevent breakage of the microstructure, as taught by Ikeda (col. 7, lines 56-61).” Applicant respectfully traverses.

Neither Muller nor Ikeda, alone or in combination, teaches or suggests the subject matter of claim 1, namely forming a sealed cavity that encapsulates a movable microstructure that is secured at an anchor point to the substrate, by using a dry plasma etchant to etch away the sacrificial materials.

Nowhere in the cited references (Muller and Ikeda) is there any suggestion, teaching, or motivation to combine the references on which the rejection is based. A *prima facie* case of obviousness cannot be established, absent any suggestion, teaching, or motivation to combine. Moreover, even if the references were so combined, the combination of Muller and Ikeda would fail to teach all of the elements and limitations recited in the claims, in any case, because neither reference teaches or suggests the encapsulation of any movable structure, nor does any of the references teach or suggest movably releasing a MEMS structure within a sealed cavity by using a dry plasma etch to etch away the sacrificial materials.

For these reasons, it is submitted that there is no proper basis for the § 102(b) rejection, or in the alternative for the 35 U.S.C. § 103 rejection, of claims 1, 3, 21, 22, and 26, which are neither anticipated nor rendered obvious by Muller and Ikeda. Applicant respectfully submits that claim 1, as currently amended, is allowable, and that claims 3, 21, 22, and 26 are allowable as depending from an allowable base claim.

5. Rejection of Claim 24 Under 35 U.S.C. § 103 (a)

Claim 24 stands rejected under 35 U.S.C. § 103 (a) as being unpatentable over Muller in view of Ikeda, and further in view of U.S. Pat. No. 5,573,679 to Mitchell et al. (“Mitchell”). Applicant respectfully traverses.

Applicant submits that claim 24, which depends on claim 1, is patentable for at least the same reasons (discussed in section 4 above) for which claim 1 is patentable.

Mitchell relates to a capacitive microphone. There is no teaching, mention, suggestion, or disclosure in Mitchell of any sealed cavity (the cavity 30 in Mitchell is not sealed), nor is there any teaching, mention, suggestion, or disclosure in Mitchell of any sealed cavity that encapsulates any microstructure, movable or otherwise.

Further, Applicant submits that nowhere in the any of the references Muller, Ikeda, and Mitchell, is there any suggestion, teaching, or motivation to combine the references on which the rejection is based. A *prima facie* case of obviousness cannot be established, absent any suggestion, teaching, or motivation to combine. Furthermore, even if the references were so combined, the combination of Muller, Ikeda, and Mitchell would in any case fail to teach all of the elements and limitations recited in claim 24, because none of the references teaches or suggests the encapsulation of any movable structure, nor does any of the references teach or suggest movably releasing a MEMS structure within a sealed cavity by using a dry plasma etch to etch away the sacrificial materials.

For these reasons, it is submitted that there is no proper basis for the § 103 rejection of claim 24, which is not rendered obvious by Muller in view of Ikeda and Mitchell.

6. Rejection of Claims 1, 2, 21, 22, 25, and 26 Under 35 U.S.C. § 103 (a)

Claims 1, 2, 21, 22, 25, and 26 stand rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Pat. No. 5,798,283 to Montegue (“Montegue”) in view of Ikeda. Applicant respectfully traverses. (Applicant believes that the Examiner meant to reject claim 3, not claim 2, since claim 2 is canceled, and claim 3 is currently pending.)

Montegue discloses that “one or more open cavities (20) are etched into a surface of the

substrate,” (see e.g. Col. 4, lines 60-61), so that the cavity extends below the surface of the substrate (see e.g. claim 1 of Montegue). Montegue also discloses that one or more MEM devices are formed “entirely below the device surface 18 of the substrate 14” (see e.g. Col. 5 lines 49-510.) In contrast, the present invention requires that a sealed cavity be formed by **depositing** a cap layer on top of sacrificial layers, which in turn have been **deposited upon the surface of the substrate**, and that the **cap layer extend from points on the surface of the support surface of the substrate**, whereby the cap layer and the support surface define a capsule about an interior region containing the microstructure. The fabrication process disclosed in Montegue is thus very different from the present invention.

There is no disclosure, teaching, suggestion or mention in Montegue of depositing a cap layer (that extends from points on the surface of the substrate) upon the surface substrate so as to form a sealed cavity that is defined between the cap layer and the substrate, as required by Claim 1. On the contrary, Montegue teaches away from the present invention, because Montegue teaches the etching of cavities into the surface of the substrate, i.e. below the surface of the substrate.

There is also no teaching, suggestion, or mention in Montegue of depositing any sacrificial layers over any planar support surface of a substrate, as required by Claim 1. There is also no teaching, suggestion, or mention in Montegue of depositing an etchable structural layer over the sacrificial layer which in turn is over the surface of the substrate. In contrast, the MEM device in Montegue is formed by depositing material layers in an open cavity etched into the surface of the substrate, so that the MEM device is entirely below the surface of the substrate. Montegue thus teaches away from the present invention.

Accordingly, neither Montegue nor Ikeda, alone or in combination, teaches, suggests, or mentions the subject matter of claims 1, 3, 21, 22, 25, and 26. Nowhere in the cited references is there any suggestion, teaching, or motivation to combine the references on which the rejection is based. Even if the references were so combined, they would fail to teach all of the elements and limitations recited in the rejected claims.

For these reasons, it is submitted that there is no proper basis for the § 103 rejection of claims 1, 3, 21, 22, 25, and 26, which are not rendered obvious by Montegue in view of Ikeda.

7. **Allowable Subject Matter**

Applicant notes with appreciation that claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant has not rewritten claim 4 in independent form, in the belief that claim 1 is allowable as currently presented, for all the reasons discussed above.

8. **Conclusion**

On the basis of the foregoing amendments, Applicant respectfully submits that all of the pending claims are in condition for allowance. An early and favorable action is therefore earnestly solicited. If there are any questions regarding these amendments and remarks, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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